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Series : E7FDG

SET-1

Q.P. Code 31/7/1

Roll No.

Candidates must write the Q.P. Code on the title page of the answer-book.

SCIENCE

*Time allowed : **3** hours* *Maximum Marks : **80***

NOTE

(I) *Please check that this question paper contains **14** printed pages.*

(II) *Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.*

(III) *Please check that this question paper contains **39** questions.*

(IV) *Please write down the Serial Number of the question in the answer-book at the given place before attempting it.*

(V) *15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period.*

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General Instructions :

Read the following instructions carefully and follow them :

(i) *This question paper contain **39** questions. **All** questions are **compulsory**.*

(ii) *The question paper is divided into **three** sections — **A**, **B** and **C**.*
Section A : Biology (30 marks)
Section B : Chemistry (25 marks)
Section C : Physics (25 marks)

(iii) *The question paper has MCQs, VSAs, SAs, LAs and CBQs. Marks are given against each question.*

(iv) *There are case based questions (CBQs) with three sub-questions and are of **4** marks each.*

(v) ***Divide your answer sheet into three sections as per the question paper –***
Section A (Biology), Section B (Chemistry) and Section C (Physics).
It is compulsory to answer each question in its respective section. Do not mix answers of one section into the other section.

(vi) *Instructions are given with each section and question, wherever necessary.*

(vii) *Kindly note that a separate question paper has been provided for visually impaired candidates.*

(viii) *There is no overall choice in the question paper. However, an internal choice has been provided in few questions. Only one of the choices in such questions must be attempted.*

SECTION A
BIOLOGY

1. Name the enzyme that acts on the protein-rich diet inside our stomach : *1*

(A) Pepsin (B) Amylase

(C) Trypsin (D) Lipase

2. Which of the following is ***not*** a function of transpiration ? *1*

(A) It helps in regulation of temperature.

(B) It helps in upward movement of water.

(C) It transports food to different parts of the plant body.

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(D) It helps in movement of minerals from the roots to the leaves.

3. The growth of tendril in pea plant is due to which of the following ? *1*

(A) Effect of chemotropism

(B) Effect of gravity

(C) Rapid growth of part of the tendril away from the point of contact with the support (object)

(D) Rapid growth of the part of the tendril in contact with the support (object)

4. Identify the hormone that regulates carbohydrate, protein and fat metabolism in the body : *1*

(A) Growth hormone (B) Adrenaline

(C) Thyroxin (D) Testosterone

5. From the following, identify the sexually transmitted diseases caused by bacteria.

(i) Warts (ii) Gonorrhoea

(iii) AIDS (iv) Syphilis

Choose the correct option : *1*

(A) (iii) and (iv) (B) (i) and (iii)

(C) (i) and (ii) (D) (ii) and (iv)

6. Mendel crossed pea plants having yellow seeds (YY) with pea plants having green seeds (yy). Yellow seeds are obtained in F_1 progeny which undergoes self-pollination to produce F_2 progeny. Select the option showing the result of F_2 progeny. *1*

(A) 3 green : 1 yellow (B) 1 yellow : 1 green

(C) 3 yellow : 1 green (D) 2 green : 2 yellow

7. Which of the following options is ***not*** a step in the process of photosynthesis ? *1*

(A) Absorption of light energy by chlorophyll

(B) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen

(C) Reduction of carbon dioxide to carbohydrates

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(D) Storage of food in roots and stems

For Questions number 8 and 9, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

8. *Assertion (A) :* Walls of the ventricles are thicker than those of the atria.

Reason (R) : Thick walls of the ventricles help in preventing the backflow of blood. *1*

9. *Assertion (A) :* In some reptiles, the temperature at which the fertilized eggs are kept determines whether the egg will develop into a male or a female.

Reason (R) : In human beings, the sex is determined genetically. *1*

10. How is ozone layer formed in our atmosphere ? State one important role of ozone in our atmosphere. What is responsible for its depletion ? *2*

11. (a) In a tobacco plant, the male gametes have twenty-four chromosomes. The number of chromosomes in the female gametes is also twenty-four. What is the number of chromosomes in the zygote produced ? How is the chromosome number in the zygote re-established ? *2*

OR

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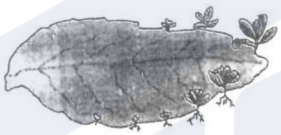
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(b) Draw a diagram of the longitudinal section of a flower and label : Sepal, Petal, Ovary and Stigma. *2*

12. Following are the diagrammatic representations of different organisms performing a process.



(a)



(b)

(i) Identify the organisms (a) and (b).

(ii) Name the process commonly shown in both the figures.

(iii) How is this process advantageous to the organisms ? *2*

13. During respiration, glucose is broken down into pyruvate. State the end products formed from it on further breakdown, in each of the following cases : *3*

(a) In yeast, in absence of oxygen.

(b) Lack of oxygen in muscles.

(c) In presence of oxygen in mitochondria.

14. (a) Improper waste disposal is a curse to the environment. Explain.

(b) Why are crop fields considered as artificial ecosystems ?

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(c) Farmers are using pesticides on the crop plants, but the chances of accumulation of harmful chemicals is greatest in human beings. Why ? Name the phenomenon. *3*

15. Read the following passage and answer the questions that follow :

Indian scientists helped crack the DNA code of 'bread-wheat' genome, which would help improve global food security. It will allow faster breeding for climate-resilient varieties with drought, heat and frost tolerance, disease-resistant and superior quality grain. It may also help people suffering from allergy to wheat gluten. The information generated will help identify genes controlling yield, grain quality, resistance to diseases, etc. A variety of grains can thus be produced.

(a) Write the full form of DNA. *1*

(b) What type of cell division is involved in the formation of gametes ? *1*

(c) (i) Variations confer an advantage to an individual to survive. Justify. *2*

OR

(c) (ii) How do genes control characteristics or traits ? *2*

16. Attempt either (a) or (b) :

(a) (i) What are the limitations of electrical impulses in multicellular organisms ?

(ii) (I) In a 'Touch-me-not' plant, movement is seen on touch. Compare it with that of animals.

(II) Name the type of movement shown by the growth of pollen tube towards an ovule. *5*

OR

(b) (i) Reflex arcs have evolved in animals because the thinking process of the brain is not fast enough for all situations. Draw a flow chart showing the path of a reflex arc. *2*

(ii) Given below are some actions/activities. Identify the part of brain involved in controlling them : *3×1=3*

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(I) Taking a walk in the garden

(II) Dancing

(III) Blood pressure

SECTION B

CHEMISTRY

17. Although most of the metals form basic oxides, which of the following metals forms an amphoteric oxide ? *1*

(A) Na (B) Ca

(C) Al (D) Cu

18. On heating ferrous sulphate crystals, one would get : *1*

(A) Sweet smell

(B) Rotten egg smell

(C) Characteristic smell of burning sulphur

(D) No smell

19. Butanal is a four-carbon compound with the functional group : *1*

(A) Carboxylic acid

(B) Aldehyde

(C) Ketone

(D) Alcohol

20. Which of the following are exothermic processes ? *1*

I. The decomposition of vegetable matter into compost

II. Dilution of an acid

III. Evaporation of water

IV. Sublimation of camphor

Options :

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(A) I and II

(B) II and III

(C) I and IV

(D) III and IV

21. The soap molecule has a : *1*

(A) Hydrophilic head and a hydrophobic tail

(B) Hydrophobic head and a hydrophilic tail

(C) Hydrophilic head and a hydrophilic tail

(D) Hydrophobic head and a hydrophobic tail

22. Which of the following statements is true for acids ? *1*

(A) Bitter and change red litmus to blue.

(B) Sour and change red litmus to blue.

(C) Sour and change blue litmus to red.

(D) Bitter and change blue litmus to red.

23. The property of carbon atoms by virtue of which they form bonds with other carbon atoms is called : *1*

(A) Chemical bonding

(B) Polymerisation

(C) Catenation

(D) Carbonisation

For Question number 24, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to this question from the codes (A), (B), (C) and (D) as given below.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

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(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

24. *Assertion (A) :* Burning of natural gas is an endothermic reaction.

Reason (R) : Methane gas reacts with oxygen to produce CO_2 and H_2O. *1*

25. A substance 'X', commonly used in baking products, reacts with dilute HCl to produce a gas 'Y' which is used in one type of fire extinguisher. Name the substance 'X' and gas 'Y'. Write a balanced chemical equation for the reaction which takes place. *2*

26. Attempt either (a) or (b) :

(a) A neutral organic compound 'A' (molecular formula C_2H_6O) reacts with acidified $K_2Cr_2O_7$ and on oxidation gives an acidic compound 'B'. Compound 'A' reacts with compound 'B' on warming, in the presence of concentrated H_2SO_4 to give a sweet smelling substance 'C'. What are A, B and C ? Also write their structures. *3*

OR

(b) Give reasons for the following : *3×1=3*

(i) Unsaturated hydrocarbons show addition reactions.

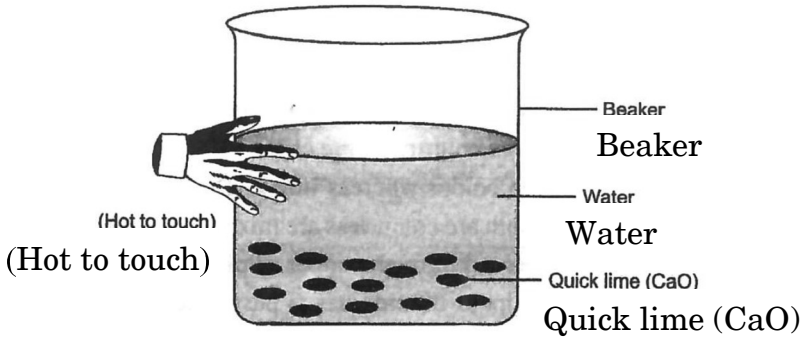
(ii) Detergents are better cleansing agents than soaps.

(iii) Carbon forms only covalent compounds.

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27.



(a) Identify the type of reaction taking place and mention why does the beaker become hot.

(b) Write the balanced chemical equation. *2+1=3*

28. Read the following passage and answer the questions that follow :

Salts are formed by reactions of acids and bases. Strong acids react with strong bases to form neutral salts. Weak acids react with strong bases to form basic salts. Acidic salts are formed by strong acids and weak bases. Na_2CO_3 and $NaHCO_3$ are salts of strong base (NaOH) and weak acid (H_2CO_3). Bleaching powder is prepared when slaked lime reacts with dry chlorine gas. Crystalline salts are hydrated and lose water on heating. Gypsum on heating at 373 K gives Plaster of Paris.

(a) What is the formula of POP (Plaster of Paris) ? What is its chemical name ? *1*

(b) Name the compound of sodium which is used for softening hard water. What is its chemical formula ? *1*

(c) (i) (I) What is water of crystallization ?

(II) Write the preparation of bleaching powder. *2*

OR

(c) (ii) (I) Name an indicator used by visually impaired children.

(II) Give one use of bleaching powder. *2*

29. Attempt either (a) or (b) :

(a) (i) Write the balanced chemical equation involved in the extraction of :

(I) Hg from HgS

(II) Zn from $ZnCO_3$

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(III) Na from NaCl

(ii) Why does sodium chloride :

(I) not conduct electricity in solid state ?

(II) have very high melting point ? *3+2=5*

OR

(b) During extraction of metals, electrolytic refining is used to obtain pure metals.

(i) Which material will be used as cathode and anode for refining of zinc metal by this process ?

(ii) Name the electrolyte used in this process. Where do we get pure zinc after passing electric current ?

(iii) How does zinc prevent rusting of iron ? Also, name the process. *1+2+2=5*

SECTION C

PHYSICS

30. Pushkar was studying a light phenomenon and wrote down the following statements in that context :

(i) A concave mirror can be used as a shaving mirror because it can form an enlarged, virtual image when the object is placed between the pole and focus.

(ii) A convex lens always forms real, inverted images, regardless of the position of the object.

(iii) The relationship between object distance (u), image distance (v) and focal length (f) of the lens is given by $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$.

Choose the option enlisting all the correct statements : *1*

(A) (i) and (ii) (B) (i) and (iii)

(C) (ii) and (iii) (D) (i), (ii) and (iii)

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31. During a lab experiment, Bhavna uses a solenoid connected to a battery. She notes down the following facts :

(i) The pattern of magnetic field lines inside the solenoid is similar to a bar magnet.

(ii) The north pole and south pole of the current-carrying solenoid can be identified by applying the right hand thumb rule.

(iii) A solenoid can be used to magnetise a piece of a soft iron, making it an electromagnet.

Choose the option enlisting all the correct statements : *1*

(A) (i) and (iii) (B) (ii) and (iii)

(C) (i) and (ii) (D) (i), (ii) and (iii)

For Question number 32, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to this question from the codes (A), (B), (C) and (D) as given below.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is ***not*** the correct explanation of Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

32. *Assertion (A) :* For a medium of given refractive index, the value of the angle of refraction corresponding to an angle of incidence is not a constant.

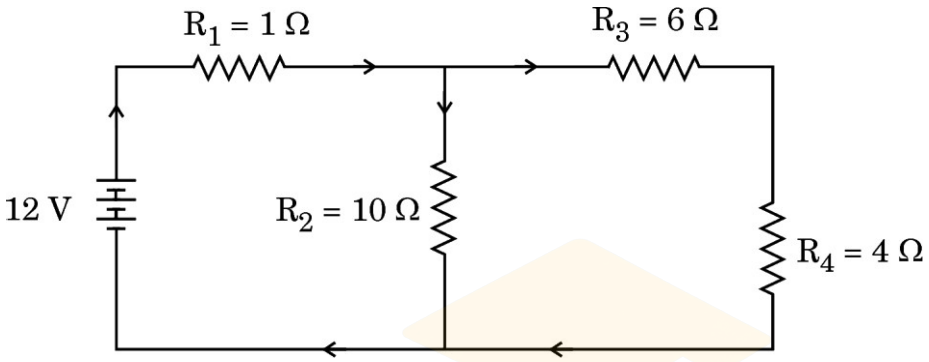
Reason (R) : With change in angle of incidence, the value of angle of refraction changes. Hence, the ratio of sine of angle of incidence to sine of angle of refraction remains constant. *1*

33. Attempt either (a) or (b) :

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(a) Calculate the total resistance of the given circuit and find the total current flowing in it. *2*



OR

(b) How would you join three resistors each of resistance 6 Ω, so that the equivalent resistance of the combination is (i) 9 Ω, and (ii) 4 Ω ? *2*

34. Draw the pattern of magnetic field produced by a current-carrying circular loop and name the factors on which the magnitude of the magnetic field due to a current-carrying circular coil depends. *2*

35. State the reasons for myopia. With the help of a ray diagram, show the :

(a) Image formation by myopic eye, and

(b) Correction of myopic eye by using an appropriate lens. *3*

36. What is meant by atmospheric refraction of light ? Explain the following natural phenomenon by using the concept of atmospheric refraction : *3*

(a) Twinkling of stars

(b) Flickering of objects seen through a turbulent stream of hot air

37. What is the use of fuse in domestic electric circuits ? How is its role different from the role of a green coloured wire given in domestic electric

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circuits ? What will happen if an electrician installs a fuse with higher-rated value than prescribed for a given electric circuit ? *3*

38. Read the following passage and answer the questions that follow :

Two students, A and B were performing an activity on refraction through glass slab and refraction through prism respectively. Student 'A' observed that the emergent light ray is parallel to the direction of incident ray, while student 'B' observed that the emergent ray is making a certain angle with respect to the direction of the incident ray in the prism, called angle of deviation. He also noted that the angle of deviation is different for different colours of light.

(a) When white light passes through a glass slab, it does not show dispersion, while it shows dispersion when it passes through a glass prism. Why ? *1*

(b) Why do we get spectrum when white light passes through tiny water droplets present in air ? *1*

(c) (i) For a given pair of mediums, if we change the angle of incidence gradually, will it change the speed of light in that medium ? Explain. *2*

OR

(c) (ii) Calculate the speed of light in a given medium if angle of incidence in air is 60° and angle of refraction in the medium is 30°. *2*

Given that speed of light in air is 3×10^8 m/s.

39. Attempt either (a) or (b) :

(a) A smart home uses energy monitoring system to track electricity usage of appliances. In a month of 30 days, the following devices are used :

1. An electric heater of 1500 W used for 4 hours daily.
2. A microwave oven rated at 1·5 kW used for 3 hours daily.

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(i) Define electric power and write its SI unit.

(ii) Calculate the total energy consumed in joules and kWh in a whole month.

(iii) Find out the total cost of electricity for running both appliances for a month of 30 days if the cost of 1 unit is ₹ 7. *5*

OR

(b) (i) What is meant by electrical resistivity of a material ?

(ii) A series electric circuit comprising a resistor made of a metallic wire has an ammeter which reads 300 mA. If the length of the wire is made three times, what will be the new reading in the ammeter ?

(iii) Calculate the resistance of a 500 m long aluminium wire of cross-sectional area $1 \times 10^{-3}\ m^2$ and resistivity $2{\cdot}65 \times 10^{-8}\ \Omega\ m$. *5*

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